

WE CLAIM:

1. A method of separating metal particulates from a slurry of original constituents of liquid metal and metal particulates and salt particulates, comprising concentrating the metal and salt particulates by removing at least some of the liquid metal, passing the liquid metal or a liquid of the original salt constituent or a mixture thereof at a temperature greater than the melting point of the original salt constituent or mixture thereof through the concentrated metal and salt particulates to further concentrate the metal particulates, and thereafter separating the metal particulates from the remaining original constituents or a mixture of the salt constituent.
2. The method of claim 1, wherein a gel is formed when at least some of the liquid metal is removed.
3. The method of claim 1, wherein liquid metal at a temperature at or above the melting point of the original salt constituent or mixture thereof and contacts the concentrated metal and salt particulates to displace salt particulates and further concentrate the metal particulates.
4. The method of claim 1, wherein a liquid of the original salt constituent contacts the concentrated metal and salt particulates to dissolve or displace salt particulates further to concentrate the metal particulates.
5. The method of claim 1, wherein a liquid mixture of the original salt constituent contacts the concentrated metal and salt particulates to dissolve or displace salt particulates further to concentrate the metal particulates.
6. The method of claim 1, wherein the original constituent of liquid metal is an alkali or an alkaline earth metal or mixtures thereof.
7. The method of claim 1, wherein the liquid original salt constituent or mixture thereof is maintained at a temperature below the sintering temperature of the metal particulates during the further concentration thereof.
8. The method of claim 7, wherein the mixture of the original salt constituent is the eutectic or substantially the eutectic of NaCl and CaCl₂.
9. The method of claim 1, wherein the metal particulates are a Ti or Ti alloy.

10. The method of claim 9, wherein the Ti alloy is 6% Al, 4% V and the remainder substantially Ti.

11. The method of claim 1, wherein the liquid metal is sodium heated to temperature greater than about 600 C.

12. The method of claim 11, wherein the sodium is heated to a temperature greater than about 800 C.

13. The method of claim 1, wherein a liquid of the original salt or a mixture thereof is heated to a temperature greater than about 600 C.

14. The method of claim 1, wherein the metal particulates are Ti or a Ti alloy and the liquid metal is Na and the salt particulates are NaCl.

15. The method of claim 14, wherein the metal particulates are a Ti alloy of 6% Al and 4% V and the remainder being substantially Ti.

16. A method of separating metal particulates from a slurry of original constituents of liquid metal and metal particulates and salt particulates, comprising introducing the slurry of original constituents into a vessel having a liquid salt therein wherein layers form due to density differences with the liquid metal being the lightest and the metal particulates being the heaviest increasing the concentration of the metal particulates toward the bottom of the vessel, removing liquid metal from the vessel, separating the concentrated metal particulates with some liquid salt from the vessel, filtering the salt from the metal particulates, and thereafter cooling and water washing the salt from the metal particulates.

17. The method of claim 16, wherein the liquid salt is substantially the same as the salt particulates.

18. The method of claim 16, wherein the liquid salt is a mixture of the salt particulates.

19. The method of claim 16, wherein the liquid salt is an eutectic or substantially the eutectic of the salt particulates.

20. The method of claim 19, wherein the eutectic contains Na and CaCl₂.

21. The method of claim 16, wherein the liquid salt is maintained at a temperature of less than about 800 C.

22. The method of claim 16, wherein the liquid salt is maintained at a temperature of about 600 C.
23. The method of claim 16, wherein the liquid metal is an alkali or alkaline earth metal or mixtures or alloys thereof.
24. The method of claim 16, wherein the liquid metal is Na or Mg.
25. The method of claim 16, wherein the liquid metal is removed from the vessel by suction with metal particulates being prevented from being removed with the liquid metal.